

(54) FEMALE URINE RECEPTOR

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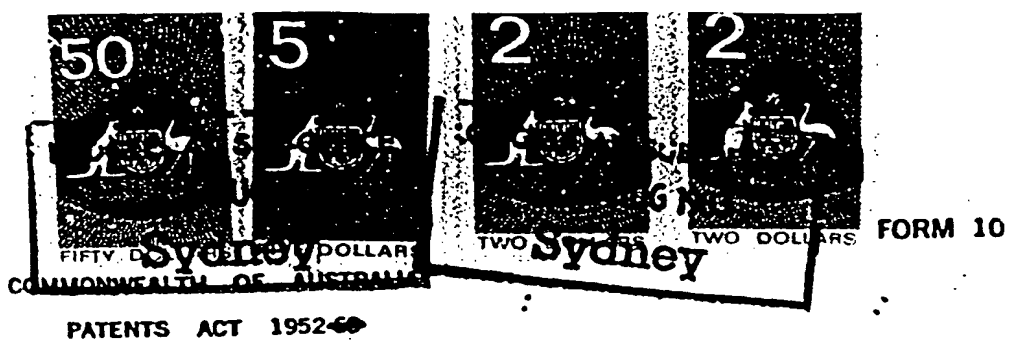
(51)³ A61F 5/44

(74) NO

(57) THE INVENTION IS A CENTRAL TUBE WHICH FITS INTO THE URETHRA AND HAS A CONCENTRIC ANNULAR SYRINGE FOR PROVIDING SUCTION TO THE GENITALIA ABOUT THE URETHRA TO HOLD THE CENTRAL TUBE IN THE URETHRA PREFERRED USE IS FOR FEMALE ASTRONAUTS

Claim

1. A non-invasive urine collection device comprising, in combination, a conduit, one end of which is in association with the urethral orifice of female external genitalia and the other end of which is in communication with the interior of a urine collection bottle; a jacket surrounding said conduit and concentric therewith, the end of said jacket remote from said bottle being adapted to conform with the contour of the tissue surface in the region of said urethral orifice; and means for applying at least a partial vacuum to the annular space defined between said conduit and said surrounding jacket.



COMPLETE SPECIFICATION

(ORIGINAL)

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Class

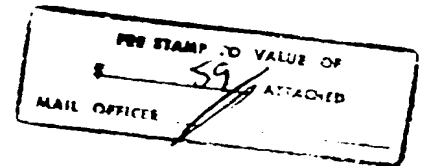
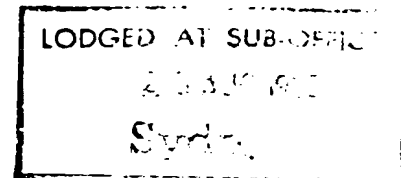
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Complete Specification for the Invention entitled:

"URINE COLLECTION AID"

The following statement is a full description of this invention, including the best method of performing it known to me/—

This invention relates to urine collection devices, and more particularly to such a device suited for use by a female astronaut while in space.

In so-called 'space capsules' and other vehicles designed to operate in zero-gravity conditions the problem of human waste products is, to some extent, controllable by means of diet. The most significant factor is, of course, excretion of urine, which cannot be achieved in the usual manner when the astronaut is experiencing zero-gravity or 'free-fall' conditions. One means of dealing with urine excretion, in the case of male astronauts, is to simply attach to the penis a conduit in communication with a collection bottle which may or may not include means for applying a partial vacuum to the bottle to ensure entry of urine thereto after leaving the penis. The so-collected urine is substantially uncontaminated and is suitable for recycling as necessary or desired, in order to render it potable.

However, a body of female astronauts has now emerged, in both the U.S.A. and the U.S.S.R., and this has complicated the urine collection problem considerably. It has been proposed to fit about the female astronauts' loins a device including a conduit having a wide mouth - reminiscent of a 'hospital urine bottle' - which fits over the external genitalia and is in communication with a collection bottle. However, in addition to collecting urine, this type of device

also tends to collect various glandular secretions, such as sweat for example - from the genital area, which secretions pass into the conduit and thence to the collection bottle along with the urine. At best these secretions inhibit effective re-cycling, and at the worst they necessitate a separate recycling unit for female urine.

Another proposal was to pass a catheter into the bladder of the female astronaut, but this unsatisfactory solution brings fresh problems in its wake. If the astronaut's bladder is catheterised only when it is necessary to micturate, there is the problem of doing so while wearing a pressurised suit. On the other hand, if such a catheter is left in position for the duration of a mission, discomfort will be experienced by the astronaut with the attendant risks of irritation of the urethra, and consequent inflammation and infection.

It is therefore an object of the present invention to overcome the above and other disadvantages of the prior art by the provision of a non-invasive urine collection device which may comprise, in combination, a conduit, one end of which is in association with the urethral orifice of the female external genitalia and the other end of which is in communication with the interior of a urine collection bottle; a jacket surrounding the conduit and concentric with it, that end of the jacket which is remote from the bottle being adapted to conform with the contour of the tissue surface in

the region of the urethral orifice; and means for applying at least a partial vacuum to the annular space defined between the conduit and the surrounding jacket. Preferably, there is also provided some means for applying at least a further partial vacuum to the interior of the urine collection bottle.

10 The annular space evacuating means may include an annular piston surrounding the conduit and reciprocally slidable within the said jacket, the annular piston being provided with one-way valve means and a substantially circumferential magnetic annulus, and a magnet surrounding the jacket and slidably movable therealong. Thus air is enabled to be evacuated from the annular space so that the device can be made to cling by suction to the said tissue surface.

The means for evacuating the urine collection bottle may well include a manually-operable, two-way valved evacuating bulb, and means for clamping the conduit, between the jacket and the bottle, may advantageously be provided.

20 In order that the reader may gain a better understanding of the present invention, hereinafter will be described a preferred embodiment thereof, by way of example only, and with reference to the accompanying drawings, in which:-

Figure 1 shows, in partial section, the device of the present invention in position; and

Figure 2 shows the device in greater detail.

In the drawings, like integers are indicated by the same reference numerals.

Figure 1 shows a non-invasive urine collection device which comprises a conduit 1, one end 2 of which is in association with a urethral orifice 3 of the female external genitalia, illustrated in section.

While the conduit end 2 is shown as being inserted in urethral orifice 3 of the urethra 4, it equally well might be adapted to just surround orifice 3 by means of a generally flat interface. The other end of conduit 1 is in communication with the interior of a urine collection bottle 5, which may be of, say, 750 ml capacity, and is shown fragmentarily.

Surrounding conduit 1, and concentric therewith, is a jacket 6 which may be maintained in suitably spaced relationship with conduit 1 by such means as the apertured 'spiders' 7, 8, (See Figure 2). One end 9 of jacket 6 is contoured so as to conform with the contour of the surface of the tissue which surrounds urethral orifice 3.

Means are provided for applying at least a partial vacuum to the annular space 10 defined between conduit 1 and surrounding jacket 6, and such means is shown in Figure 2. Surrounding conduit 1 and reciprocally slidable in jacket 6 is an annular piston 11 which is provided with a one-way valve which may be of the kind which has a cage 12, a ball 13 moving

in a passage 14, and a narrower valve seat 15.

Incorporated in piston 11 is a circumferential annulus 16 made of a magnetic material and surrounding the jacket 6; and slidably movable therealong is a magnet 17. This magnet 17 may well be a ring magnet of the pole-less kind or it may be a part-annular horseshoe magnet. Thus when magnet 17 is moved manually in the direction indicated by arrow A, the valve closes and at least a partial vacuum is applied to that part of annular space 10 between piston 11 and 'spider' 7 when the device is in position as shown in Figure 2, the device being enabled to thereby cling to the tissue surface in the region of the urethral orifice 3. The mode of operation is to initially move magnet 17 and piston 11, in the direction indicated by arrow B, to the limit of travel, and then to apply the end 9 of jacket 6 to the region surrounding urethral orifice 3 and then to engender at least a partial vacuum in the annular space by moving magnet 17 and piston 11 in direction A. In some individuals, the labia minora may assist in maintaining the device in position. From time to time, as necessary or desired, the partial vacuum can be renewed by slight reciprocating movement of the piston and magnet.

In order to prevent piston 11 from spontaneously returning towards end 9 by reason of suction, the annular magnet 17 may be provided with an annular groove 18 adapted to co-operate with a bead 19 on that end of jacket 6 closest to

collection bottle 5 when the limit of travel has been reached. Needless to say, the 'strength' of magnet 17 must be such as to withstand the vacuum applied to piston 11, that is to say, such as to effectively hold magnetic annulus 16.

Means are also provided for the application of at least a further partial vacuum to the interior of urine collection bottle 5, and such means is shown in Figure 1. Conduit 1 is connected to a urine delivery tube 20 via a connector 21, and to enable bottles to be changed when one is full, a pair of screw clamps 22, 23 may be provided.

The evacuating means includes a conventional, manually-operable, two-way valved rubber or other flexible bulb 24 and the purpose of such means to at least partially evacuate bottle 5 is to be able to draw down into, and keep within, the bottle, any urine which is expressed from urethral orifice 3 under zero-gravity conditions.

As will be realised, the piston may be reciprocated by means other than hand-operated magnetic means, and the bottle may be evacuated by means other than a valved bulb, although the comparatively simple 'low technology' device described is preferred in the interests of reliability.

The conduit, jacket, piston, delivery tube and bottle may be made from such as a suitable plastics material, and it should be noted that the use of suction prevents leakage of urine as well as holding the device in position.

While the abovegoing description has been couched

in terms of a urine collection device for use by female astronauts, it is to be understood that use by such persons as incontinent or totally immobilised patients or invalids is also envisaged, and thus the reader will readily appreciate that these devices will provide the public with a new or much-improved apparatus or, at the very least, offer to it an attractive and useful choice.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A non-invasive urine collection device comprising, in combination, a conduit, one end of which is in association with the urethral orifice of female external genitalia and the other end of which is in communication with the interior of a urine collection bottle; a jacket surrounding said conduit and concentric therewith, the end of said jacket remote from said bottle being adapted to conform with the contour of the tissue surface in the region of said urethral orifice; and means for applying at least a partial vacuum to the annular space defined between said conduit and said surrounding jacket.

2. The non-invasive urine collection device as claimed in Claim 1, wherein there is provided means for applying at least a further partial vacuum to the interior of said urine collection bottle.

3. The non-invasive urine collection device as claimed in Claim 1 or Claim 2, wherein said annular space evacuating means includes an annular piston surrounding said conduit and reciprocally slidable within said jacket, said annular piston being provided with one-way valve means and a substantially circumferential magnetic annulus; and a magnet surrounding said jacket and slidably movable therealong, whereby air can be evacuated from said annular space to thereby enable said

device to cling to said tissue surface by suction.

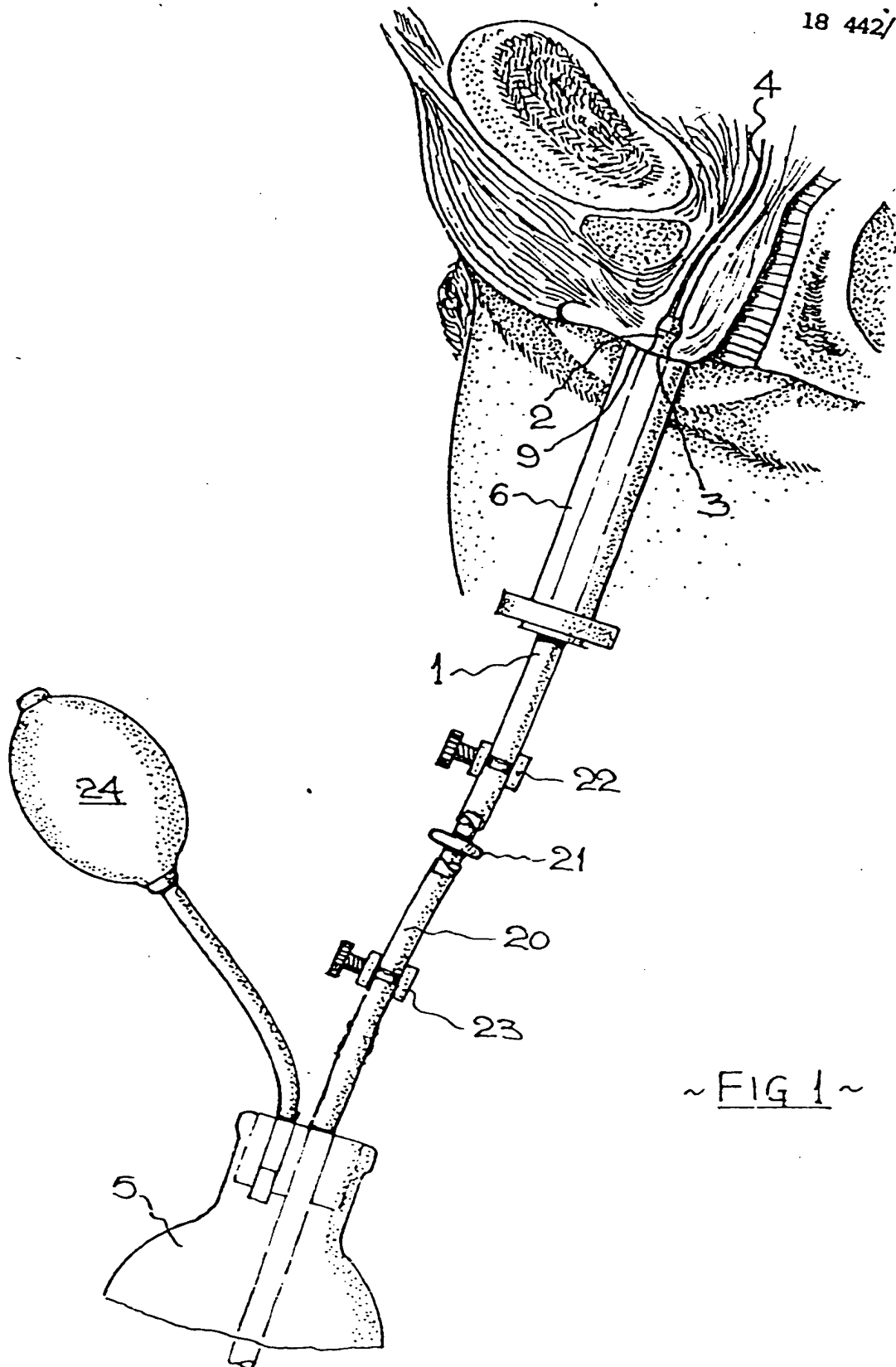
4. The non-invasive urine collection device as claimed in Claim 2 or Claim 3, wherein said urine collection bottle evacuating means includes a manually-operable, two-way valved evacuating bulb, clamping means for said conduit being provided intermediate said jacket and said urine collection bottle.

5. A non-invasive urine collection device, substantially as hereinbefore described with reference to the accompanying drawings.

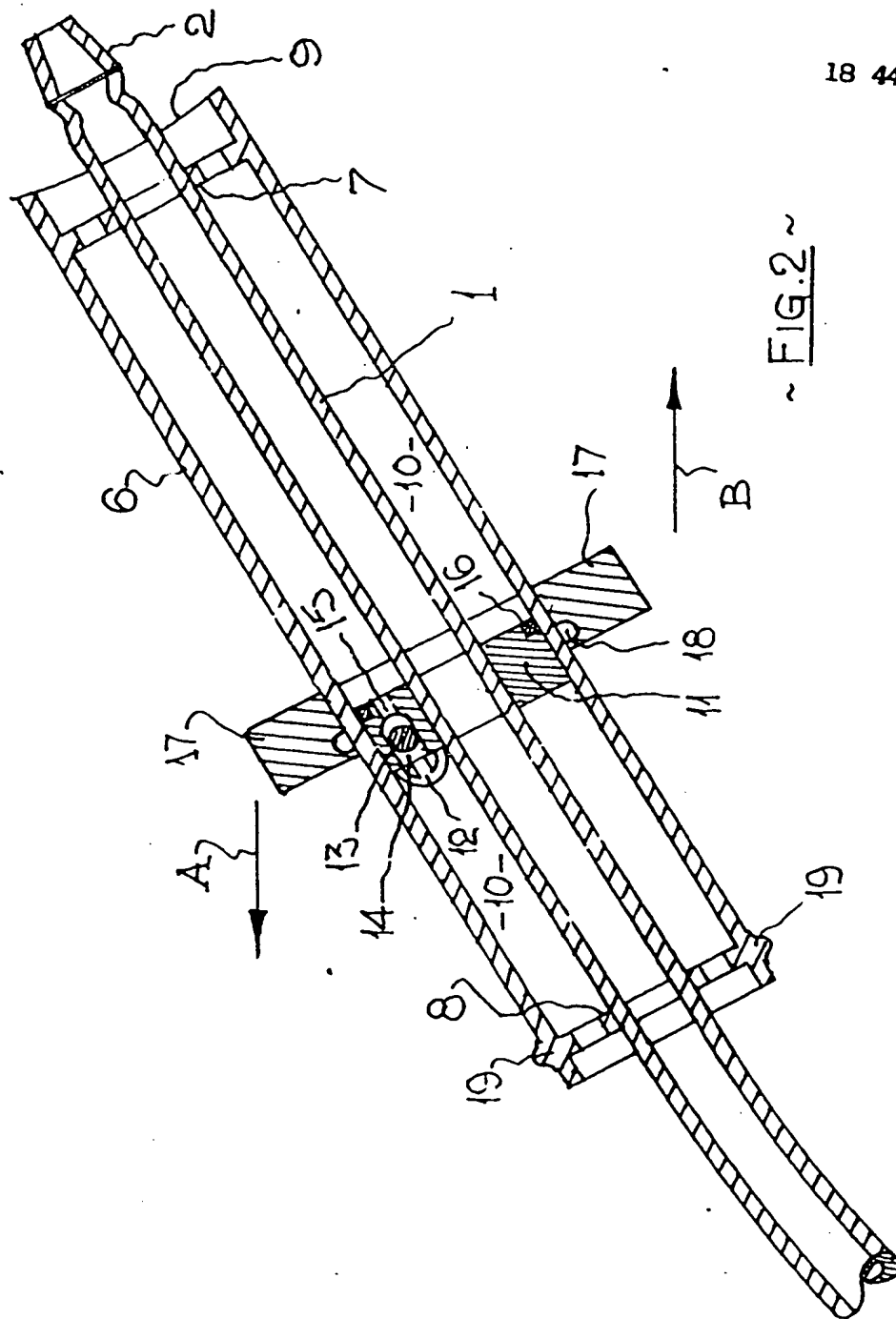
DATED this 24th day of August, 1983.

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~FIG 1~



~ FIG. 2 ~

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